15 GLOSSARY

A_{min}: The smallest *area of elevated activity* identified using the DQO Process that it is important to identify.

action level: A scanning measurement level for residual radioactivity that (1) is based on the DCGL and (2) triggers a response, such as further investigation or cleanup, if exceeded. See *investigation level*.

activity: See *radioactivity*.

affected area: This term was previously used for areas that would be designated *Class 1 or Class 2*.

affected/non-uniform: This term was previously used for areas that would be designated *Class 1*.

affected/uniform: This term was previously used for areas that would be designated *Class 2*.

ALARA (acronym for as low as is reasonably achievable): A basic concept of radiation protection which specifies that exposure to ionizing radiation and releases of radioactive materials should be reduced as far below regulatory limits as is reasonably achievable considering economic, technological, and societal factors, among others. Reducing exposure at a site to *ALARA* strikes a balance between what is possible through additional remediation and the use of additional resources to achieve a lower level. A determination of *ALARA* is a site-specific analysis that is open to interpretation, because it depends on approaches or circumstances that may differ between regulatory agencies. An *ALARA* recommendation should not be interpreted as a set limit or level.

alpha (α): The specified maximum probability of a *Type I decision error*, i.e., the maximum probability of rejecting the *null hypothesis* when it is true. *Alpha* is also referred to as the *size of the test*. *Alpha* reflects the amount of evidence the *decision maker* would like to see before abandoning the *null hypothesis*.

alpha particle: A positively charged particle emitted by some radioactive materials undergoing *radioactive decay*.

alternative hypothesis (H_a): See *hypothesis*.

area: A general term referring to any portion of a *site*, up to and including the entire *site*.

area of elevated activity: An *area* over which *residual radioactivity* exceeds a specified value $DCGL_{EMC}$.

area factor (A_m): A factor used to adjust $DCGL_W$ to estimate $DCGL_{EMC}$ and the *minimum detectable concentration* for scanning surveys in *Class 1* survey units —

$DCGL_{EMC} = (DCGL_W)(A_m)$. A_m is the magnitude by which the *residual radioactivity* in a small *area of elevated activity* can exceed the $DCGL_W$ while maintaining compliance with the *release criterion*.

arithmetic mean: The average value obtained when the sum of individual values is divided by the number of values.

arithmetic standard deviation: A statistic used to quantify the variability of a set of data. It is calculated in the following manner: (1) subtracting the arithmetic mean from each data value individually; (2) squaring the differences; (3) summing the squares of the differences; (4) dividing the sum of the squared differences by the total number of data values less one; and (5) taking the square root of the quotient. The calculation process produces the Root Mean Square Deviation (RMSD).

background radiation: Radiation from cosmic sources; *naturally occurring radioactive material*, including radon (except as a decay product of *source* or *special nuclear material*); and global fallout as it exists in the environment from the testing of nuclear explosive devices or from nuclear accidents which contribute to *background radiation* and are not under the control of the licensee. *Background radiation* does not include radiation from *source*, *byproduct*, or *special nuclear materials* regulated by the NRC.

becquerel (Bq): The International System (SI) unit of activity equal to one nuclear transformation (disintegration) per second. 1 *Bq* = 2.7×10^{-11} *Curies (Ci)* = 27.03 picocuries (pCi).

beta (β): The probability of a *Type II decision error*, i.e., the probability of accepting the null hypothesis when it is false. The complement of *beta* $(1-\beta)$ is referred to as the *power* of the test.

beta particle: An electron emitted from the nucleus during *radioactive decay*.

bias: The systematic or persistent distortion of a measurement process which causes errors in one direction.

biased sample or measurement: See *judgment sample* or *measurement*.

byproduct material: Any radioactive material (except *special nuclear material*) yielded in or made radioactive by exposure to the radiation incident to the process of producing or utilizing *special nuclear material*.

CEDE (committed effective dose equivalent): The effective *dose equivalent* is the summation of the products of the dose equivalent received by specified tissues of the body and a tissue-specific weighting factor. It is a risk-equivalent value, expressed in *Sv* or *rem*, that can be used to estimate the health effects on an exposed individual. See *TEDE*.

characterization survey: A type of *survey* that includes facility or *site* sampling, monitoring, and analysis activities to determine the extent and nature of contamination. *Characterization*

surveys provide the basis for acquiring necessary technical information to develop, analyze, and select appropriate *cleanup* techniques.

Class 1 area: Areas containing locations in which, prior to remediation, the concentrations of residual radioactivity may have exceeded the $DCGL_W$.

Class 1 survey: A type of *final status survey* that applies to *areas* with the highest potential for contamination. Class 1 surveys require (1) sufficient measurements on a systematic grid to meet the desired error rates for the statistical hypothesis tests; (2) scanning over 100% of the survey unit; (3) scanning MDC at or below the $DCGL_{EMC}$.

Class 2 area: Areas containing no locations where, prior to remediation, the concentrations of residual radioactivity may have exceeded the $DCGL_W$.

Class 2 survey: A type of *final status survey* that require (1) sufficient measurements on a systematic grid to meet the desired error rates for the statistical hypothesis tests; (2) judgmental scanning of a portion, up to 100%, of the survey unit.

Class 3 area: Areas with a low probability of containing any locations with residual radioactivity.

Class 3 survey: A type of *final status survey* that require (1) sufficient measurements at randomly chosen locations to meet the desired error rates for the statistical hypothesis tests; (2) judgmental scanning over less than 10% of the survey unit.

classification: The act or result of separating *areas* or *survey units* into one of three designated classes: *Class 1 area*, *Class 2 area*, or *Class 3 area*.

composite sample: A sample formed by collecting several samples and combining them (or selected portions of them) into a new sample which is then thoroughly mixed.

confirmatory survey: A type of *survey* that includes limited independent (third-party) measurements, sampling, and analyses to verify the findings of a *final status survey*.

contamination: The presence of *residual radioactivity* in excess of levels which are acceptable for release of a *site* or facility.

criterion: See *release criterion*.

critical group: The group of individuals reasonably expected to receive the greatest exposure to *residual radioactivity* for any applicable set of circumstances.

critical level (L_c): A fixed value of the *test statistic* corresponding to a given probability level, as determined from the sampling distribution of the *test statistic*. L_c is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a background value as greater than background.

curie (Ci): The customary unit of radioactivity. One *curie* (Ci) is equal to 37 billion disintegrations per second (3.7×10^{10} dps = 3.7×10^{10} Bq), which is approximately equal to the decay of one gram of ^{226}Ra. Fractions of a *curie*, e.g. picocurie (pCi) or 10^{-12} Ci and microcurie (µCi) or 10^{-6} Ci, are levels typically encountered in *decommissioning*.

DQA (Data Quality Assessment): The scientific and statistical evaluation of data to determine if the data are of the right type, quality, and quantity to support their intended use.

DQOs (Data Quality Objectives): Qualitative and quantitative statements that clarify study objectives, define the appropriate type of data, and specify levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

DCGL (derived concentration guideline level): A derived, radionuclide-specific activity concentration within a *survey unit* corresponding to the *release criterion*. The *DCGL* is based on the spatial distribution of the contaminant and hence is derived differently for the Wilcoxon test (*DCGL$_W$*) and the *Elevated Measurement Comparison* (*DCGL$_{EMC}$*). The *DCGL$_W$* is derived assuming that residual radioactivity is uniformly distributed over a wide area, i.e. the entire survey unit. This can often be the default DCGL provided by an exposure pathway model. The *DCGL$_{EMC}$* is derived assuming that residual radioactivity is concentrated in a much smaller area, i.e. in only a small percentage of the entire survey unit.

decay: See *radioactive decay*.

decision maker: The person, team, board, or committee responsible for the final decision regarding disposition of the *survey unit*.

decommission: To remove a facility or *site* safely from service and reduce *residual radioactivity* to a level that permits (1) release of the property for unrestricted use and termination of the *license* or (2) release of the property under restricted conditions and termination of the *license*.

decommissioning: The process of removing a facility or *site* from operation, followed by *decontamination* and license termination.

decontamination: The removal of radiological contaminants from, or their neutralization on, a person, object or area to within established levels. *Decontamination* is sometimes used interchangeably with *remediation*, remedial action, and *cleanup*.

delta (δ): The amount that the distribution of measurements for a *survey unit* is shifted to the right of the distribution of measurements of the *reference area*.

delta (Δ): The width of the *gray region*. Δ divided by the *arithmetic standard deviation* of the measurements, σ, is the *relative shift,* Δ/σ, expressed in multiples of standard deviations. See *relative shift, gray region*.

derived guideline(s): A level or levels of radioactivity presented in terms of ambient radiation, surface activity level(s), and soil activity concentration(s). Derived guidelines are derived from activity/dose relationships through various *exposure pathway* scenarios. See *DCGL*.

detection sensitivity: The ability to identify the presence of radiation or *radioactivity*.

direct measurement: Radioactivity measurement obtained by placing the detector against the surface or in the media being surveyed. The resulting radioactivity level is read out directly.

dose commitment: The dose that an organ or tissue would receive during a specified period of time (e.g., 50 or 70 years) as a result of intake (as by ingestion or inhalation) of one or more radionuclides from a given release.

dose equivalent (dose): A quantity that expresses all radiations on a common scale for calculating the effective absorbed dose. This quantity is the product of absorbed dose (rads) multiplied by a quality factor and any other modifying factors. Dose is measured in *Sv* or *rem*.

epsilon (ϵ): A fraction of a survey unit that has not been remediated to the reference-based cleanup standard. ϵ is used in the Quantile test.

elevated area: See *area of elevated activity*.

elevated measurement: A measurement that exceeds a specified value, the $DCGL_{EMC}$.

Elevated Measurement Comparison (EMC): This comparison is used in conjunction with the Wilcoxon test to determine if there are any measurements that exceed a specified value $DCGL_{EMC}$.

exposure pathway: The route by which radioactivity travels through the environment to eventually cause a radiation exposure to a person or group.

exposure rate: The amount of ionization produced per unit time in air by X-rays or gamma rays. The unit of exposure rate is roentgens/hour (R/h); for decommissioning activities the typical units are microroentgens per hour (μR/h), i.e. 10^{-6} R/h.

external radiation: Radiation from a source outside the body.

final status survey: Measurements and sampling to describe the radiological conditions of a survey unit, following completion of decontamination activities (if any).

gamma (γ) radiation: Penetrating high-energy, short-wavelength electromagnetic radiation (similar to X-rays) emitted during *radioactive decay*. Gamma-rays are very penetrating and require dense materials (such as lead or uranium) for shielding.

graded approach: An approach to data collection and interpretation that places the greatest survey efforts on areas that have, or had, the highest potential for *residual radioactivity*.

gray region: A range of values below the appropriate *DCGL* for a *site* in which decision errors carry relatively less risk or economic consequence.

grid: A network of intersecting and vertical lines used for the purpose of identification of exact locations. See *reference coordinate system, sampling grid*.

grid area: See *sampling grid area*.

grid block: A square defined by two adjacent vertical and two adjacent horizontal *reference coordinate* lines.

half-life ($t_{1/2}$): The time required for one-half of the atoms present to disintegrate.

Historical Site Assessment (HSA): A detailed investigation to collect existing information, primarily historical information, on a *site* and its surroundings.

hot measurement: See *elevated measurement*.

hot spot: See *area of elevated activity*.

hypothesis: An assumption about a property or characteristic of a set of data under study. The goal of statistical inference is to decide which of two complementary hypotheses is likely to be true. The *null hypothesis* describes what is assumed to be the true state of nature and the *alternative hypothesis* describes the opposite situation.

impacted area: Areas with some potential for residual contamination .

indistinguishable from background: The detectable concentration distribution of a radionuclide is not statistically different from the background concentration distribution of that radionuclide in the vicinity of the site or, in the case of structures, in similar materials using adequate measurement technology, survey, and statistical techniques.

inventory: Total residual quantity of formerly licensed radioactive material at a site.

investigation level: A radionuclide specific level of radioactivity that results in additional investigation when it is exceeded, to determine if the survey unit was properly classified. See *action level, elevated measurement*.

judgment sample or measurement: A sample or measurement taken at a location where radiation levels or other site characteristics are expected to be unusual, based on the judgment and/or experience of a skilled investigator. Also called authoritative or biased. Samples or measurements that are *not* of this type are considered representative of the site being studied.

k: When conducting the Quantile test, *k* is the number of measurements from the survey unit that are among the *r* largest measurements of the combined set of reference area and cleanup unit measurements.

less-than data: Measurements that are less than the *minimum detectable concentration*.

license: A license issued under the regulations in Parts 30 through 35, 39, 40, 60, 61, 70 or Part 72 of 10 CFR Chapter I.

licensee: The holder of a *license*.

license termination: Discontinuation of a *license*, the eventual conclusion to *decommissioning*.

lower bound of the gray region (LBGR): The minimum value of the gray region. The width of the *gray region* (*DCGL − LBGR*) is also referred to as the shift, *Δ*.

lower limit of detection (L$_D$): The smallest amount of radiation or radioactivity that statistically yields a net result above the method background. The critical level, L_C, is the value set for deciding that radioactivity is detected with a specified Type I error rate. The detection limit, L_D, is the level at which the power to detect net radioactivity is set.

m: The number of measurements required from the reference area to conduct a statistical test with specified *Type I* and *Type II* error rates.

minimum detectable concentration (MDC): The *a priori* activity level that a specific instrument and technique can be expected to detect a specified percentage of the time. When stating the detection capability of an instrument, this value should be used. The *MDC* is the detection limit, L_D, multiplied by an appropriate conversion factor to give units of activity.

missing or unusable data: Data (measurements) that are mislabeled, lost, or do not meet quality control standards. *Less-than data* are not considered to be missing or unusable data.

N: $N = m + n$, is the total number of measurements required from the reference area and a *survey unit* being compared with the *reference area*. See *m* and *n*.

n: Number of measurements required from a survey unit to conduct a statistical test that has specified *Type I* and *Type II* error rates.

naturally occurring radionuclides: Radionuclides and their associated progeny produced during the formation of the earth or by interactions of terrestrial matter with cosmic rays.

non-detect: A measurement below the *critical level, L_C.*

non-impacted area: Areas in which there is no reasonable possibility of residual contamination.

nonparametric test: A test based on relatively few assumptions about the exact form of the underlying probability distributions of the measurements. As a consequence, nonparametric tests are generally valid for a fairly broad class of distributions. The *Wilcoxon Rank Sum test* and the *Sign test* are examples of nonparametric tests.

normal (Gaussian) distribution: A family of bell-shaped distributions described by the mean and variance.

outlier: Measurements that are unusually large relative to the bulk of the measurements in the data set.

Pitman efficiency: A measure of performance for statistical tests. It is equal to the reciprocal of the ratio of the sample sizes required by each of two tests to achieve the same power, as these sample sizes become large.

power (1-β): The probability of rejecting the *null hypothesis* when it is false. The power is equal to one minus the *Type II* error rate, i.e. $(1 - \beta)$.

precision: A measure of mutual agreement among individual measurements, usually under prescribed similar conditions, expressed generally in terms of the *arithmetic standard deviation*.

quality assurance (QA): An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed and expected by the client.

Quality Assurance Project Plan (QAPP): A formal document describing in comprehensive detail the necessary *QA*, *QC*, and other technical activities that must be implemented to ensure that the results of the work performed satisfies the stated performance criteria.

quality control (QC): The overall system of technical activities that measure the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the client. *QC* includes operational techniques and activities that are used to fulfill requirements for *quality*.

Quantile Test: A nonparametric test that looks at only the *r* largest measurements of the N combined reference area and survey unit measurements. If a sufficiently large number of these *r* measurements are from the survey unit, then the test indicates the survey unit has not attained the reference-based cleanup standard.

R$_A$: The acceptable level of risk associated with not detecting an *area of elevated activity* of area A_{min}.

radiation (ionizing radiation): Alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation, as used in this document, does not include non-ionizing radiation, such as radio- or microwaves, or visible, infrared, or ultraviolet light.

radioactive decay: The spontaneous transformation of an unstable atom into one or more different nuclides accompanied by either the emission of energy and/or particles from the nucleus, nuclear capture or ejection of orbital electrons, or fission. Unstable atoms decay into a more stable state, eventually reaching a form that does not decay further or has a very long *half-life*.

radioactivity: The mean number of nuclear transformations occurring in a given quantity of radioactive material per unit time. The International System (SI) unit of radioactivity is the *Becquerel (Bq)*. The customary unit is the *Curie (Ci)*.

radiological survey: Measurements of radiation levels associated with a *site* together with appropriate documentation and data evaluation.

radionuclide: An unstable nuclide that undergoes *radioactive decay*.

random error: The deviation of an observed value from the true value is called the error of observation. If the error of observation behaves like a random variable—i.e., its value occurs as though chosen at random from a probability distribution of such errors—it is called a *random error*. See *systematic error*.

readily removable: A qualitative statement of the extent to which a radionuclide can be removed from a surface or medium using non-destructive, common, housekeeping techniques (e.g., washing with moderate amounts of detergent and water) that do not generate large volumes of radioactive waste requiring subsequent disposal or produce chemical wastes that are expected to adversely affect public health or the environment.

reference area: Geographical *area* from which representative reference measurements are performed for comparison with measurements performed in specific *survey units* at remediation site. A site radiological *reference area* (background area) is defined as an area that has similar physical, chemical, radiological, and biological characteristics as the site area being remediated, but which has not been contaminated by site activities. The distribution and concentration of *background radiation* in the *reference area* should be the same as that which would be expected on the *site* if that *site* had never been contaminated. More than one *reference area* may be necessary may be necessary for valid comparisons if a *site* exhibits considerable physical, chemical, radiological, or biological variability.

reference coordinate system: A *grid* of intersecting lines referenced to a fixed site location or benchmark. Typically the lines are arranged in a perpendicular pattern dividing the survey location into squares or blocks of equal areas. Other patterns include three-dimensional and polar coordinate systems.

reference grid: A network of parallel horizontal and vertical lines forming squares on a map that may be overlaid on a property parcel for the purpose of identification of exact locations. See *reference coordinate system*.

reference region: The geographical region from which *reference areas* will be selected for comparison with *survey units*.

relative shift (Δ/σ): Δ divided by σ, the *standard deviation* of the measurements, is the *relative shift* expressed in multiples of standard deviations. See *delta*.

release criteria: The criteria for license termination given in 10 CFR 20.1402 and 10 CFR 20.1403, expressed in terms of total effective dose equivalent (TEDE).

release criterion: A regulatory limit expressed in terms of dose or risk.

rem (roentgen equivalent man): The conventional unit of *dose equivalent*. The corresponding International System (SI) unit is the *Sievert (Sv)*: 1 Sv = 100 rem.

remediation: The process and associated activities resulting in removal of contamination from a site. Remediation is sometimes used interchangeably with the terms remedial action, response action, or *decontamination*.

remediation control survey: A type of survey that includes monitoring the progress of remedial action by real time measurement of areas being decontaminated to determine whether or not efforts are effective and to guide further *decontamination* activities.

removable activity: Surface activity that can be *readily removed* and collected for measurement by wiping the surface with moderate pressure.

residual radioactivity: Radioactivity in structures, materials, soils, groundwater, and other media at a site resulting from activities under the licensee's control. This includes radioactivity from all licensed and unlicensed sources used by the licensee, but excludes background radioactivity. It also includes radioactive materials remaining at the site as a result of routine or accidental releases of radioactive material at the site and previous burials at the site, even if those burials were made in accordance with the provisions of 10 CFR Part 20.

restricted use: A designation following *remediation* requiring radiological controls at a formerly licensed *site*.

sample: A part or selection from a medium located in a *survey unit* or *reference area* that represents the quality or quantity of a given parameter or nature of the whole area or unit; a portion serving as a specimen.

sampling grid: The pattern of points formed by the locations chosen for *systematic sampling*.

sampling grid area: The area bounded by adjacent sampling locations on a systematic *sampling grid*. If the linear distance between samples is L, then the grid area is L^2 for a square sampling grid and $0.866L^2$ for a triangular sampling grid.

scanning: An evaluation technique performed by moving a detection device over a surface at a specified speed and distance above the surface to detect elevated levels of radiation.

scoping survey: A type of *survey* that is conducted to identify (1) radionuclide contaminants, (2) relative radionuclide ratios, and (3) general levels and extent of contamination.

shape parameter (S): For an elliptical area of elevated activity, the ratio of the semi-minor axis length to the semi-major axis length is the shape parameter. For a circle, the shape parameter is one. A small shape parameter corresponds to a flat ellipse.

Sievert (Sv): The special name for the International System (SI) unit of *dose equivalent*. 1 Sv = 100 *rem* = 1 Joule per kilogram.

Sign test: A *nonparametric* statistical test used to demonstrate compliance with the release criterion when the radionuclide of interest is not present in background and the distribution of data is not symmetric. See also *Wilcoxon Rank Sum test*.

site: Any installation, facility, or discrete, physically separate parcel of land, or any building or structure or portion thereof, that is being considered for release.

size (of a test): See *alpha*.

soil: The top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter. A particular kind of earth or ground—e.g., sandy soil.

soil activity (soil concentration): The level of radioactivity present in soil and expressed in units of activity per soil mass (typically Bq/kg or pCi/g).

source material: Uranium and/or thorium other than that classified as *special nuclear material*.

source term: All residual radioactivity remaining at the *site*, including material released during normal operations, during inadvertent releases or accidents, and includes radioactive materials which may have been buried at the site in accordance with 10 CFR Part 20.

special nuclear material: Plutonium, ^{233}U, and uranium enriched in ^{235}U; material capable of undergoing a fission reaction.

square sampling grid: A systematic grid of sampling locations that is arranged in a square pattern. See *sampling grid*.

standard normal distribution: A *normal (Gaussian) distribution* with mean zero and variance one.

standard operating procedure (SOP): A written document that details the method for an operation, analysis, or action with thoroughly prescribed techniques and steps, and that is officially approved as the method for performing certain routine or repetitive tasks.

subsurface soil sample: A soil sample taken deeper than 15 cm below the soil surface.

surface contamination: *Residual radioactivity* found on building or equipment surfaces and expressed in units of activity per surface area (Bq/m^2 or dpm/100 cm^2).

surface soil sample: A soil sample taken from the first 15 cm of surface soil.

surrogate: Radionuclide A is a *surrogate* for radionuclide B if there is an established ratio between their concentrations in a survey unit. The concentration of radionuclide B can then be inferred from the measured concentration of radionuclide A.

survey: A systematic evaluation and documentation of radiological measurements with a correctly calibrated instrument or instruments that meet the sensitivity required by the objective of the evaluation.

survey plan: A plan for determining the radiological characteristics of a *site*.

survey unit: A geographical area of specified size and shape at a remediated site for which a separate decision will be made whether the unit attains the site-specific reference-based cleanup standard for the designated pollution parameter. *Survey units* are generally formed by grouping contiguous site areas with a similar use history and the same classification of contamination potential. Survey units are established to facilitate the survey process and the statistical analysis of survey data.

systematic error: An error of observation based on system faults which are biased in one or more ways, e.g., tending to be on one side of the true value more than the other.

systematic sampling: Taking measurements or samples at locations according to a spatial pattern. See *triangular sampling grid*, *square sampling grid*.

tandem testing: Two or more statistical tests conducted using the same data set.

TEDE (total effective dose equivalent): The effective dose equivalent is the summation of the products of the *dose equivalent* received by specified tissues of the body and a tissue-specific weighting factor. It is a risk-equivalent value, expressed in *Sv* or *rem*, that can be used to estimate the health-effects on an exposed individual. When calculating *TEDE*, the licensee shall base estimates on the greatest annual *TEDE* dose expected within the first 1000 years after decommissioning. Estimates must be substantiated using actual measurements to the maximum extent practical. See *CEDE*.

test statistic: A function of the measurements (or their ranks) that has a known distribution if the *null hypothesis* is true. This is compared to the *critical level* to determine if the *null hypothesis* should be rejected.

tied measurements: Two or more measurements that have the same value.

triangular sampling grid: A grid of sampling locations that is arranged in a triangular pattern. See *sampling grid*.

two-sample t-test: A parametric statistical test used in place of the *Wilcoxon Rank Sum (WRS) test* if the *reference area* and *survey unit* measurements are known to be *normally (Gaussian) distributed* and there are no *less-than measurements* in either data set.

Type I decision error: A decision error that occurs when the *null hypothesis* is rejected when it is true. The probability of making a *Type I decision error* is called *alpha* (α).

Type II decision error: A decision error that occurs when the *null hypothesis* is accepted when it is false. The probability of making a *Type II decision error* is called *beta* (β).

unaffected area: An impacted area that is expected to contain little, if any, residual radioactivity, based on a knowledge of site history and previous survey information. This term was previously used for areas designated *Class 3*.

unity rule (mixture rule): A rule applied when more than one radionuclide is present at a concentration that is distinguishable from background and where a single concentration comparison does not apply. In this case the mixture of radionuclides is compared against default concentrations by applying the unity rule. This is accomplished by determining (1) the ratio between the concentration of each radionuclide in the mixture and (2) the concentration for that radionuclide in an appropriate listing of default values. The sum of the ratios for all radionuclides in the mixture should not exceed 1.

unrestricted area: Any *area* where access is not controlled by a *licensee* for purposes of protection of individuals from exposure to radiation and radioactive materials—including areas used for residential purposes.

unrestricted release: Release of a *site* from regulatory control without requirements for future radiological restrictions. Also known as unrestricted use.

Wilcoxon Rank Sum (WRS) test: A *nonparametric* statistical test used to determine compliance with the *release criterion* when the radionuclide of concern is present in background. See also *Sign test*.

z_ϕ: the ϕth quantile of a standard normal distribution. Also called the 100ϕ percentile. The probability of observing a value less than z_ϕ is equal to ϕ. See *standard normal distribution*.